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PROCESS FOR PROGRAMMING AN ELECTRONIC APPARATUS AND  
ASSOCIATED ELECTRONIC APPARATUS

The present invention pertains to a process for programming an  
5 electronic apparatus in the standby state and more especially to a process of admission to a channel of this apparatus, each channel being identified by a number. The invention also pertains to an electronic apparatus and to a system comprising a controlled apparatus and means of control.

Controls, and more especially remote controls, for television  
10 receiver, decoder, video recorder, disk reader or recorder, or other electronic apparatus comprise, in general, a certain number of buttons. In the case of remote controls, the latter make it possible to transmit coded signals conveyed, usually by infrared carrier, to the receiver to be controlled. In what follows, to simplify the account, reference will be made only to a television  
15 receiver controlled by a remote control device. However, the invention applies more generally to any type of apparatus which may be controlled by a control device, such as a decoder, a video recorder, a disk reader and/or recorder, etc.

The television receiver being in the enabled state, the admission  
20 to a channel identified by a number with at least two digits is often felt to constitute a complex operation. In order to access a given channel with two digits, it is in fact necessary for the user to select in succession the button of the tens digit of the channel and then the button for the units.

This same operation becomes all the more tiresome if the receiver  
25 is placed in the standby state, so as to limit its consumption of energy. Indeed, the user is confronted with two methods of admission to the desired channel. He can press any button of the remote control, this taking him to the channel associated with this button, then perform the operation described hereinabove of selecting two buttons corresponding to the digits of the  
30 desired channel so as to access same. Alternatively he can press the re-enable button, generally designated "ON" this leading him to the channel on which the user was before the latest placement on standby, then, in a

manner similar to the above, perform the operation of selecting two buttons corresponding to the digits of the desired channel. These two methods of admission to the desired channel are, obviously, complex and lengthy.

European patent application EP352 446 relates to a device for  
5 selecting programs in apparatus fitted with a remote control. The program whose character corresponds to the first button depressed is immediately selected, then a time delay is instigated in the course of which the apparatus considers any subsequent characters so as to concatenate them to obtain the complete identifier of the program. If the identifier of the program is coded  
10 on more than one character, this method initially selects a program which is not the one desired by the user.

The aim of the present invention is to simplify the operations of the user in this latter context, and to allow effective connection to the channel desired by the user.

15 The subject of the invention is a process for controlling an electronic apparatus able to receive data from a plurality of transmission channels, each channel being respectively identified by a word composed of at least one character, each character being selected by a specific control signal, characterized in that, the apparatus being in the standby state, it  
20 furthermore comprises the following consecutive steps:

- reception of at least one signal, the time gap separating two receptions being less than a given duration  $\Delta t$ , the signals received determining the identification of a channel by concatenation of the characters respectively associated with the signals received,

25 - activation of the apparatus following a duration  $\Delta t$  in the course of which no signal is received,

- selection by the apparatus of the previously identified channel.

Thus, the process of selecting the desired channel turns out to be simplified and the switching-on of the apparatus faster for the user since, the  
30 apparatus being in the initial standby state, the user can, by virtue of the invention, reach the desired channel directly without having to go via an intermediate enabling button. The apparatus is activated only on completion

of a certain duration in the course of which no button is depressed; this duration constitutes a signal for validating the series of signals previously received. The word composed of the characters associated with these signals is the identifier of the program desired by the user.

5 According to a first embodiment, a part comprising a certain number of the latest signals received determines the identification of the channel. In this way, the user can overwrite characters previously entered.

According to one embodiment, the step of admission to the latest word stored is conditioned by a step of verification of consistency of this  
10 latest word verifying the validity of this word.

According to one embodiment, a character is an alphanumeric value.

According to one embodiment, a control signal is a message comprising a field of bits comprising a numerical value specific to a means of  
15 selecting a channel, of the type of a button.

The subject of the invention is also an electronic apparatus, comprising means for receiving a plurality of control signals received, each control signal being associated respectively with a character for the identification of a transmission channel, first means of storage for storing at  
20 least one character associated with a control signal, means of selection of the transmission channels identified by at least one character, means of control for controlling the means of selection to the channel identified by the character stored in the means of storage, a means of re-enabling the electronic apparatus, characterized in that the apparatus furthermore  
25 comprises for its re-enabling from a standby state:

means of calculation for iteratively constructing a word of characters which is determined by the concatenation of the character associated with a control signal received with the latest word stored in the first means of storage if said signal is received within a span less than a  
30 duration  $\Delta t$  determined with respect to the reception of the previous signal,

the control means controlling the means of selection to the channel determined by the latest word of characters stored in the first means

of storage followed by an absence of reception of control signals for the duration  $\Delta t$ , said control means furthermore controlling the re-enabling means.

According to one embodiment, the apparatus comprises means of comparison between the content of the latest word stored and the content of a set of words which is stored in the apparatus respectively identifying the set of existing channels so as to verify the compliance of this set.

The subject of the invention is also a system comprising a controlled apparatus and second means of control for transmitting control signals for controlling said apparatus, in particular remote control means of the type of a remote control, of a keypad, characterized in that said apparatus is the electronic apparatus described hereinabove.

Other characteristics and advantages of the invention will become apparent with the description of some of its embodiments, this description being given with reference to the drawings appended hereto, in which :

- Figure 1 diagrammatically represents a system comprising a remote control box and a television,
- Figure 2 represents a remote control box,
- Figure 3 represents a diagram of a circuit contained in this box,
- Figure 4 represents a flowchart showing the sequence of operations for selecting the channel and enabling the apparatus.

To simplify the description, the same references will be used to designate the elements fulfilling identical functions.

The device of Figure 1 comprises a television 1 furnished :

- with a tuner 2 receiving a signal for example from an antenna 3 and transposing the frequency of this signal to an intermediate frequency intended for a video intermediate frequency amplifier 4 and for a sound intermediate frequency amplifier 5 which follow thereupon,
- with a demodulator 6, following the sound intermediate frequency amplifier 4, which delivers the baseband audio signals to an audio power amplifier 7, feeding a loudspeaker 8,

- with a demodulator 9, following the video intermediate frequency amplifier 4, producing a baseband video signal for a video amplifier 10 delivering the ad-hoc signals to the electrodes of a cathode ray picture tube 11,

5 - with a central unit 12, comprising a microprocessor 121 and a control element 122, for managing all these functions. The control element can be integrated into the microprocessor. A memory block 13, linked to the microprocessor 12, comprises a first memory 131 provided for storing data, including, among other things, the current values of the various settings of  
10 the television. A second memory 132 of the memory 13 comprises a program for re-enabling the television in the standby state. The central unit is of course linked by a bus 14 to all the elements of the apparatus which may be controlled by the control element: the tuner (choice of channels), the video and sound circuits (various level settings), possibly scanning circuits (not  
15 represented) for choosing various picture formats,

- with a receiver of controls 15 for receiving, in series, infrared light signals S from a remote control box 16, and transmitting them to the microprocessor 12.

The remote control box 16 of Figure 2 comprises a button for  
20 placing on standby 17, a pair of buttons 18 making it possible to increase or decrease the value of a parameter, for example the power of the sound, a numerical pad 19 making it possible in particular to choose a channel, buttons 20 making it possible for example to increase or decrease the number of the channel received. It is by means of the buttons of the  
25 numerical pad 19 that a channel identified by a number with two digits can be communicated to the television 1, as will be seen in what follows.

Figure 3 illustrates an example of a circuit useable for such a remote control box. A battery 21 powers a customized microprocessor 22 and a light-emitting diode 23, controlled by a transistor 24. The  
30 microprocessor contains a processor known per se, as well as necessary ROM and RAM memories, and comprises a modulator which delivers pulses

(intended for the diode 23) whose duration and number are programmable, and it possesses an output for the control of the transistor 24.

An array 25 of ten positions is provided in the memory of the remote control, in which array is recorded, in each position corresponding to 5 a numerical value of the buttons, a numerical value corresponding to a channel. In general, the first nine channels of the stations usually referenced 1, 2, 3,... are recorded on the ten positions and it is possible to record in addition a channel at the position of the 0 button.

The control signal  $S_i$  ( $i$  corresponding to the number of control 10 signals transmitted to the television) originating from the remote control and bound for the television, be it in the enabled or standby state, comprises a control message of type known per se. It comprises a field containing a numerical value ranging from 0 to 9, containing the numerical value selected by the user by pressing the corresponding button. It can, furthermore, begin 15 with a field containing a "one" start digit, a field for describing the system which the control aspires to reach (video recorder, television, decoder, disk reader and/or recorder, etc).

The present invention operates in the following manner:

The television being in the standby state, when the user presses a 20 button of the remote control, the microprocessor 22 causes the transmission, by the diode 23, of a message conveying the programmed numerical value associated with the position of the selected button. The television receives the infrared signal from the remote control, which conveys it to the microprocessor 12. The latter calls upon the standby software module stored 25 in the memory 13.

The standby software essentially comprises the following functions:

- acquisition of the infrared signals,
- decoding of these infrared signals making it possible to decipher 30 the numerical values transmitted by the remote control,
- construction of a connection message according to the algorithm of the following standby software module:

the connection message consisting of the string of decoded numerical values, the algorithm for constructing the connection message implemented in the memory 132 and executed by the microprocessor follows the following steps:

5 - at the instant  $t_1$ , after decoding of the first message deciphering a first numerical value, the latter is stored in the memory 131,

- at the instant  $t_2 = t_1 + \Delta t$ , with  $\Delta t = 200$  ms (according to the present embodiment), two possibilities arise:

10 1. If no message has been decoded and if the numerical value stored corresponds to a string of digits (consistency of the connection message), then the application software is instigated and starts all the elements so as to allow effective connection to the desired channel and the operation of the television.

15 2. If a second message is decoded during the span  $\Delta t$  deciphering a second numerical value, then the construction of the connection message is performed by replacing in the memory 131 the first numerical value with a new number having the first numerical value as tens digit and the second numerical value as units digit.

20 In an iterative manner, the decoding of several other messages following one another by a span of less than  $\Delta t$  entails the deciphering of the numerical values corresponding to these messages and the consideration of the latter in each new connection message stored (during the consideration of a new numerical value, the numerical value previously corresponding to the units digit is left-shifted so as to correspond henceforth to the tens digit, the numerical value previously corresponding to the tens digit is left-shifted so as to correspond to the hundreds digit, the numerical value previously corresponding to the left-most digit is lost).

25 - verification of the consistency of the final connection message corresponding to the final number stored in the memory 131: as explained earlier, it is verified that the numerical value stored corresponds to a string of digits and does not correspond to an inconsistent string of commands of the type of the successive selection of the "1", "+" then "CH" buttons. If an

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inconsistency in the connection message is detected, the standby software does not execute the application software. Conversely, if the consistency of the message is validated, the application software controls the admission to the channel whose number is closest to the number requested by comparing  
5 the latter with the content of a database of all the channels comprising programs.

The flowchart of Figure 4 illustrates the running of the operations performed by the standby software module stored in the memory 13. In step 1, the module waits for the reception of a message originating from the  
10 remote control. It jumps to step 2 when it receives a message. In step 2, the module tests for whether a message has already been received, that is to say, for whether the memory 131 already contains a first message corresponding to the selection of a channel. If yes (step 3), the module performs a shift of the messages: the message corresponding to the units  
15 becomes that corresponding to the tens. If there is already a message corresponding to the tens, it is overwritten by the new one. In step 4, regardless of the previous events, the units space is free to receive the new message. Next (step 5), the module instigates a time delay and watches to see whether, in the course of the latter, a new message is received. If yes,  
20 the module loops to step 3, to make space and then store this new message. If no, the user has not pressed a button of his remote control, it therefore validates the list of messages sent to the television receiver. In step 6, the module instigates the program for re-enabling the television depicting the channel whose number is the concatenation of the message of the tens and  
25 of the units.

Of course, the invention is not limited to the embodiment described in the present patent application. For example, although the term channel corresponds to a specific frequency band in the case of the embodiment described, the latter can correspond to a track of the apparatus  
30 in the case of the disk reader and/or recorder. Likewise, the invention is not limited to the entry of a channel number with two digits, but with one or more digits.

Likewise, it is conceivable for a channel to be identified by a word of characters of the type "C+", "MTV" (in the case where the control means comprises alphanumeric buttons). The consistency step will then have to allow for the existence of such channel names.